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Availability and Accessibility of Maternal Health Services and their Role in Reducing Maternal Mortality in Rural Areas

Ume Zuhra Bughio
Health Services Academy, Islamabad, Pakistan
Anchal Kumari
Liaquat National Medical College, Karachi, Sindh, Pakistan
Hira Jamil
Department of Pharmacy Practice, Faculty of Pharmacy, Jinnah University for Women, Karachi, Pakistan
Abdul Razzaque Nohri*
Health Department, Government of Sindh, Pakistan. Corresponding Author Email: razaquenohri@gmail.com
Kirsh Kumar
Jinnah Sindh Medical University, Karachi, Sindh, Pakistan
Sajan Sarang
Health Department, Government of Sindh, Pakistan

ABSTRACT

Background: Maternal mortality remains a critical public health challenge in low- and middle-income countries, with rural areas disproportionately affected due to limited resources and systemic healthcare disparities. In Pakistan, rural maternal mortality rates exceed urban rates by a significant margin. **Objectives:** To assess the availability and accessibility of maternal health services in rural areas and examine their role in reducing maternal mortality. **Methods:** A cross-sectional survey was conducted among 180 women in selected rural areas. Data were collected using structured interviews to assess demographic characteristics, service availability (antenatal care, skilled birth attendants, emergency obstetric care), and accessibility factors (distance, transportation, affordability). Health records from local facilities were reviewed to identify maternal mortality cases. Descriptive statistics summarized key variables, while chi-square tests examined associations between service-related factors and maternal mortality, with significance set at $p < 0.05$. **Results:** Over half of respondents (54.4%) had no formal education, and 57.8% had a monthly income below PKR 20,000. Antenatal care facilities were available to 84.4% of respondents, skilled birth attendants to 76.7%, and emergency obstetric care to 52.2%, while only 48.9% had access to 24/7 delivery services. Significant

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associations with reduced maternal mortality were found for the presence of skilled birth attendants (p = 0.006), distance to health facilities ≤10 km (p = 0.009), and availability of emergency obstetric care (p = 0.026). **Conclusion:** Improving service availability, accessibility, and affordability, alongside strengthening emergency obstetric care and skilled attendance, is essential to reduce rural maternal mortality in Pakistan.

Keywords: Maternal Mortality, Rural Health, Skilled Birth Attendants, Emergency Obstetric Care, Accessibility

Introduction

Maternal mortality remains one of the most pressing global public health challenges, particularly in low- and middle-income countries (LMICs). According to the World Health Organization (WHO), approximately 295,000 women die each year from complications related to pregnancy and childbirth, with the overwhelming majority of these deaths occurring in resource-constrained settings.[1] Nearly 94% of maternal deaths occur in underdeveloped countries, with South Asia alone accounting for almost one-fifth of the global burden. Within this regional context, Pakistan exhibits a particularly troubling scenario, ranking among the countries with the highest maternal mortality ratios (MMR) in Asia.[2]

As per the Pakistan Maternal Mortality Survey (PMMS) 2019, the national MMR stands at 186 deaths per 100,000 live births. However, disaggregated data reveal substantial disparities between rural and urban populations: rural areas record an MMR of 199, nearly 26% higher than the urban rate of 158.[3] These figures not only highlight systemic inequities in healthcare access but also underscore the urgent need for targeted interventions aimed at improving maternal health outcomes in rural regions.[4]

Maternal mortality is a complex and multifaceted problem, influenced by socioeconomic, cultural, infrastructural, and political factors. In rural Pakistan, key determinants include poverty, lack of education, gender-based inequalities, poor-quality healthcare services, inadequate health infrastructure, sociocultural norms that restrict women's autonomy, malnutrition, and distance to healthcare facilities.[5] The prevalence of traditional birth practices, reliance on unskilled attendants, and delayed decision-making further compound these risks. In many rural communities,

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women have limited control over their own health decisions, leading to delays in seeking care, inability to access skilled providers, and increased exposure to preventable complications.[6]

Despite being a signatory to the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs), Pakistan has struggled to meet maternal health targets. SDG 3.1 calls for reducing the global MMR to less than 70 per 100,000 live births by 2030, a goal that appears distant for Pakistan without significant systemic reforms. While notable progress has been made in increasing antenatal care coverage and facility-based deliveries, these improvements have been unevenly distributed, favoring urban over rural populations.[7]

The challenges are exacerbated by political instability, underinvestment in health infrastructure, and inadequate human resources for health. Pakistan spends less than 1% of its GDP on healthcare, with insufficient allocation for maternal and reproductive health services.[8] Rural health facilities often lack trained personnel, essential medicines, emergency obstetric care capabilities, and referral systems. Consequently, many rural women die either en route to distant urban hospitals or after receiving substandard care.[9]

Education plays a pivotal role in maternal health outcomes. Data indicate that 62% of rural women of reproductive age are uneducated, compared to 34% in urban areas. Education not only increases awareness of maternal health needs but also correlates strongly with higher utilization of antenatal and delivery care services.[10] Moreover, gender-based violence, child marriages, and harmful traditional practices further increase the vulnerability of rural women, limiting their access to timely and appropriate maternal care.[11]

International organizations, such as the WHO, UNFPA, and UNICEF, alongside national programs like the Lady Health Worker Programme, have played important roles in expanding maternal healthcare coverage in Pakistan.[12] However, gaps remain in service quality, continuity of care, and community engagement. Achieving substantial reductions in MMR in rural areas will require sustained political commitment, increased financial investment, and strategic interventions tailored to the unique needs of these communities.[13]

Ultimately, the availability and accessibility of maternal health services are not

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merely healthcare issues—they are human rights imperatives. Ensuring that rural women receive safe, respectful, and high-quality maternal care is essential for reducing maternal mortality, improving newborn outcomes, and advancing Pakistan's broader development goals. [14]

This study aims to assess the availability and accessibility of maternal health services in rural Pakistan, identify barriers to utilization, and evaluate their impact on maternal mortality, with recommendations for improving maternal health outcomes and equity.

Methods

This study aimed to examine the availability and accessibility of maternal health services and their role in reducing maternal mortality in rural areas. A cross-sectional survey was conducted in selected rural region to assess both the availability of maternal health services (such as prenatal care, skilled birth attendants, and emergency obstetric care) and their accessibility (factors like distance to health facilities, transportation options, and affordability).

Data were collected through structured interviews. The study also used community-level data to identify the number of healthcare facilities providing maternal services, their operational hours, and availability of trained healthcare staff. To measure maternal mortality rates, health records from local health centers and hospitals were reviewed, focusing on deaths related to pregnancy and childbirth.

Descriptive statistics were used to summarize the data on service availability, accessibility, and maternal mortality. Inferential statistical tests, such as chi-square tests, were employed to analyze the relationship between the availability/accessibility of services and maternal mortality rates, adjusting for factors like socioeconomic status and education.

Results

A total of 180 women from rural areas participated in the study. The findings are presented in alignment with the study objectives, focusing on demographic characteristics, availability of maternal health services, accessibility of these services, and their relationship with maternal mortality.

Table 1 presents the demographic profile of respondents. The largest proportion of participants (47.8%) were between 26–35 years of age, followed by 30.0% in the 18–

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25 age group and 22.2% aged 36–45 years. More than half of the respondents (54.4%) had no formal education, while only 20.0% had completed secondary or higher education. The majority (78.9%) were housewives, with a smaller proportion working as skilled workers (12.2%) or in farming/labor (8.9%). Monthly household income was below PKR 20,000 for 57.8% of respondents, with only 13.3% reporting an income greater than PKR 40,000.

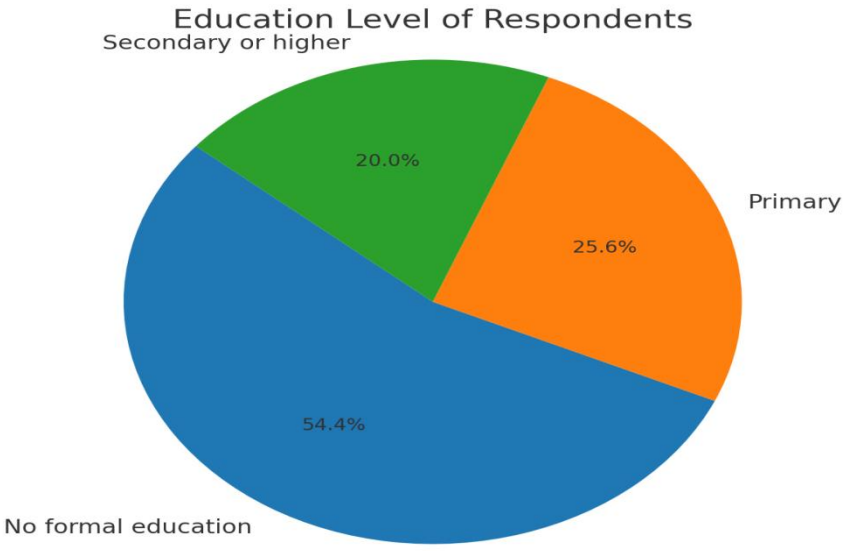
Table 1: Demographic Characteristics of Respondents (n = 180)

Variable	Category	Frequency (n)	Percentage (%)
Age group (years)	18–25	54	30.0
	26–35	86	47.8
	36–45	40	22.2
Education level	No formal education	98	54.4
	Primary	46	25.6
	Secondary or higher	36	20.0
Occupation	Housewife	142	78.9
	Skilled worker	22	12.2
	Farmer/laborer	16	8.9
Monthly income (PKR)	< 20,000	104	57.8
	20,000–40,000	52	28.9
	> 40,000	24	13.3

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The availability of key maternal health services in the study area is summarized in Table 2. Antenatal care facilities were available to 84.4% of respondents, and 76.7% reported the presence of skilled birth attendants in their locality. However, emergency obstetric care was available to just over half of the respondents (52.2%), and only 48.9% reported the presence of 24/7 delivery services. Postnatal care services were available for 70.0% of the women, while 56.7% indicated that essential medicines were readily available at health facilities. These findings indicate gaps in service provision, particularly for emergency obstetric care and round-the-clock delivery services.

Table 2: Availability of Maternal Health Services in the Study Area

Service Type	Available (n, %)	Not Available (n, %)
Antenatal care (ANC) facilities	152 (84.4)	28 (15.6)
Skilled birth attendants	138 (76.7)	42 (23.3)
Emergency obstetric care	94 (52.2)	86 (47.8)
24/7 delivery services	88 (48.9)	92 (51.1)
Postnatal care (PNC) services	126 (70.0)	54 (30.0)
Availability of essential medicines	102 (56.7)	78 (43.3)

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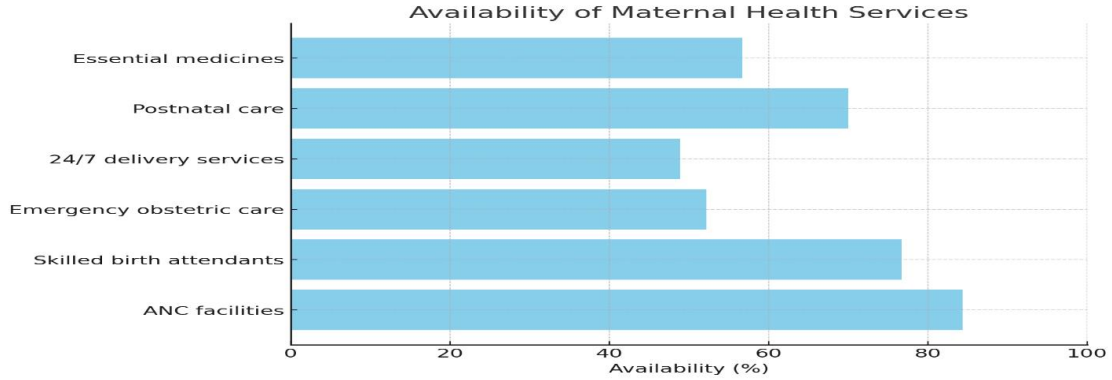


Table 3 illustrates accessibility factors. The distance to the nearest maternal health facility was more than 10 km for 32.2% of respondents, while 35.6% lived within 5 km. Transportation was always available for 40.0% of respondents, but 37.8% reported it was only sometimes available, and 22.2% rarely or never had access to transportation. Cost was also a significant barrier: 56.7% of respondents considered maternal health services unaffordable, compared to 43.3% who found them affordable. These results highlight that geographic and economic barriers are key determinants in the accessibility of maternal care in rural areas.

Table 3: Accessibility of Maternal Health Services

Accessibility Factor	Category	Frequency (n)	Percentage (%)
Distance to nearest maternal facility	< 5 km	64	35.6
	5–10 km	58	32.2
	> 10 km	58	32.2
Transportation availability	Always available	72	40.0
	Sometimes	68	37.8
	Rarely/Never	40	22.2
Cost affordability for services	Affordable	78	43.3
	Not affordable	102	56.7

The relationship between service availability/accessibility and reported maternal deaths is shown in Table 4. Significant associations were observed for three variables. The presence of skilled birth attendants was strongly associated with lower

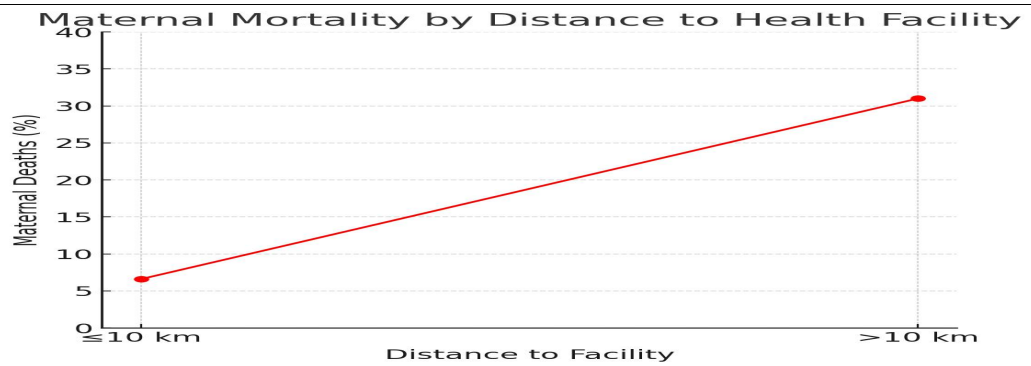
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maternal mortality (p = 0.006); only 8.7% of respondents with access to skilled attendants reported a maternal death, compared to 33.3% without such access. Similarly, distance to health facilities was a significant factor (p = 0.009), with higher mortality among women living more than 10 km away (31.0%) compared to those within 10 km (6.6%). Availability of emergency obstetric care was also significantly associated (p = 0.026) with reduced mortality, with lower rates reported where such services were available (10.6%) compared to where they were not (18.6%).

Table 4: Association Between Accessibility/Availability and Maternal Mortality (Chi-square test)

Variable	Maternal Deaths Reported (%)	No Maternal Deaths (%)	χ^2 (p-value)
Skilled birth attendants	Yes: 12 (8.7%)	126 (91.3%)	7.42 (0.006)
	No: 14 (33.3%)	28 (66.7%)	
Distance to facility (>10 km)	Yes: 18 (31.0%)	40 (69.0%)	6.85 (0.009)
	≤10 km: 8 (6.6%)	114 (93.4%)	
Emergency obstetric care	Available: 10 (10.6%)	84 (89.4%)	4.97 (0.026)
	Not available: 16 (18.6%)	70 (81.4%)	



Discussion

This study examined the availability and accessibility of maternal health services in rural areas and their association with maternal mortality. The findings reveal

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persistent gaps in service provision, geographic and economic barriers, and significant associations between certain service-related factors and maternal mortality outcomes.

One of the most prominent findings of this study was the educational profile of the respondents, with over half having no formal education. This is consistent with broader evidence from rural populations, where low literacy rates among women contribute to poor health-seeking behaviors, delayed antenatal visits, and reliance on unskilled birth attendants.[15] Education not only improves awareness of maternal health needs but also empowers women to make timely healthcare decisions. Studies in similar rural contexts have repeatedly shown that maternal mortality rates are significantly higher among women with little or no education, highlighting the importance of female literacy as a determinant of maternal survival.[16]

The availability of maternal health services was variable. While antenatal care facilities and skilled birth attendants were accessible to the majority of respondents, substantial gaps existed in emergency obstetric care, round-the-clock delivery services, and availability of essential medicines.[17] The absence of emergency obstetric care is particularly concerning, as timely surgical interventions and management of complications such as hemorrhage or eclampsia can be life-saving. Evidence from multiple settings shows that the presence of well-equipped emergency obstetric units significantly reduces case fatality rates in obstetric emergencies.[18] Similarly, round-the-clock services are critical in addressing complications that often arise outside standard operating hours, and their absence in over half the study area represents a major systemic shortfall.[19]

Accessibility emerged as a critical determinant of maternal health service utilization. A considerable proportion of respondents lived more than 10 kilometers from the nearest facility, and transportation availability was inconsistent. These findings align with the "three delays" model widely cited in maternal health literature: delays in deciding to seek care, delays in reaching care, and delays in receiving appropriate care.[20] Geographic isolation, coupled with poor road infrastructure and limited transportation, is a well-documented barrier to timely obstetric intervention. Cost-related barriers further compound the problem, with

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more than half of respondents reporting that services were unaffordable. This economic inaccessibility echoes patterns observed across low-income rural contexts, where out-of-pocket expenditure deters women from seeking institutional deliveries or emergency care.[21]

A particularly significant outcome of this study was the statistical association between certain factors and maternal mortality. The presence of skilled birth attendants was associated with markedly lower mortality rates. This aligns with global evidence that skilled attendance at birth—supported by adequate facilities and supplies—is one of the most effective interventions for preventing maternal deaths. Skilled personnel are trained to recognize complications early, initiate life-saving interventions, and ensure timely referrals, thereby reducing the likelihood of fatal outcomes.[22]

Distance to facilities was another significant predictor. Women living more than 10 kilometers away had substantially higher reported maternal mortality compared to those within closer proximity. This mirrors findings from rural regions in other developing countries, where maternal mortality risk increases exponentially with travel time to healthcare facilities. Delays in reaching care often result in women arriving at facilities in critical condition, reducing the chances of successful intervention.[23]

The availability of emergency obstetric care was also significantly associated with reduced maternal mortality. This finding is consistent with the core recommendation of global health agencies that every woman should have access to comprehensive emergency obstetric and newborn care services. Facilities equipped to handle complications such as obstructed labor, postpartum hemorrhage, and sepsis are essential for lowering maternal mortality rates, particularly in rural areas where referral systems are weak.[24]

These results reinforce the understanding that maternal mortality is not solely a medical issue but a complex interplay of social, economic, and infrastructural determinants. Interventions must therefore address both supply-side factors—such as increasing the number of well-equipped facilities, ensuring adequate staffing, and maintaining essential drug supplies—and demand-side barriers, including transportation availability, affordability, and community awareness.

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Strengthening rural health infrastructure, ensuring skilled birth attendance, improving emergency obstetric care, and addressing transportation and affordability barriers are essential to reduce maternal mortality and achieve equitable maternal health outcomes.

This cross-sectional study relied on self-reported data, which may introduce recall bias. Findings from selected rural areas may not be generalizable to all regions, limiting nationwide applicability.

Conclusion

This study highlights significant gaps in the availability and accessibility of maternal health services in rural areas, with clear links to maternal mortality. Factors such as distance to facilities, presence of skilled birth attendants, and availability of emergency obstetric care strongly influence outcomes. Addressing geographic, economic, and infrastructural barriers alongside improving service quality remains essential for reducing maternal deaths and achieving equitable maternal health across rural Pakistan.

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